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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/917,842

07/27/2001

Barry L. Chin

5017/ISM/CORE  
MCVD/SB

3573

32588

7590

07/29/2003

APPLIED MATERIALS, INC.  
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SANTA CLARA, CA 95050

EXAMINER

KOSOWSKI, ALEXANDER J

ART UNIT

PAPER NUMBER

2125

DATE MAILED: 07/29/2003

7

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/917,842

Applicant(s)

CHIN ET AL.

Examiner

Alexander J Kosowski

Art Unit

2125

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 08 July 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other:

### **DETAILED ACTION**

- 1) Claims 1-11, as amended 7/8/03, and new claims 12-19 are presented for examination.

#### ***Claim Rejections - 35 USC § 112***

- 2) The 112 rejection of claim 3 from the previous office action is hereby withdrawn in light of the amendment filed 7/8/03.

- 3) The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

- 4) Claim 4 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Referring to claim 4, there is no recitation of the use of an electrostatic chuck in the specification.

#### ***Drawings***

- 5) The objection to the drawings is withdrawn in light of the amendment filed 7/8/03.

#### ***Claim Rejections - 35 USC § 102***

- 6) The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Art Unit: 2125

7) Claims 1, 3, 5-6, 13-15, 17 and 19 are rejected under 35 U.S.C. 102(b) as being unpatentable over Nath et al (U.S. Pat 4,423,701). The claimed invention reads on Nath as follows:

Referring to claim 1, Nath discloses an apparatus comprising a deposition chamber, wherein the deposition chamber is divided into two or more deposition regions that are integrally connected to one another and a wafer support disposed in the deposition chamber, wherein the wafer support is moveable between the two or more interconnected deposition regions (col. 7 lines 67-68 and col. 8 lines 1-46 and Figure 4, whereby individual wafers may be moved between connected deposition chambers).

Referring to claim 3, Nath discloses a heater wherein the heater controls the temperature within each of the two or more deposition regions in the deposition chamber (Abstract, whereby heating elements warm the substrate to a desired temperature).

Referring to claims 5 and 6, Nath discloses that the deposition regions are integrally connected with an aperture and that the aperture is sealed to minimize the intermixing of deposition gases between the regions (col. 8 lines 47-68 and col. 9 lines 1-8, whereby a "gas gate" is considered an aperture).

Referring to claim 13, Nath discloses that the first and second deposition regions may be vertically stacked (col. 7 lines 62-66).

Referring to claims 14-15, Nath discloses first and second orifices for providing process gas to first and second deposition regions (col. 7 line 51 through col. 8 line 19 and Figure 4, whereby it is noted than an orifice is needed in each deposition chamber to supply gas) and that the first orifice may be disposed vertically above the second orifice (col. 7 lines 62-66, whereby

Art Unit: 2125

the deposition regions may be vertically stacked and therefore the orifices would be vertically disposed).

Referring to claim 17, Nath discloses a method of depositing a material layer on a substrate comprising positioning a substrate of a wafer support in a deposition chamber comprising a first deposition region and a second deposition region, wherein the first and second deposition regions are integrally connected to one another (col. 7 line 51 through col. 8 line 19 and Figure 4), depositing a first monolayer on the wafer disposed on the substrate support in the first deposition region, moving the wafer positioned on the substrate support to the second deposition region, and depositing a layer on the wafer in the second deposition region (col. 7 line 67 through col. 8 line 2).

Referring to claim 19, Nath discloses that first and second gases are introduced into the first and second deposition regions (col. 6 lines 34-47 and col. 7 line 67 through col. 8 line 2, whereby it is noted that each deposition regions contains a distinct gas).

***Claim Rejections – 35 USC § 103***

8) The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9) Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nath as shown above, further in view of Matsukawa et al (U.S. Pat 5,518,542).

Art Unit: 2125

Referring to claim 2, Nath discloses the apparatus shown above. However, Nath does not explicitly teach a piston coupled to the wafer support for moving the wafer support between the two or more interconnected deposition regions.

Matsukawa teaches a wafer support whereby a piston is used to raise and lower the wafer (col. 7 lines 39-46).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize a piston coupled to the wafer support in the apparatus taught by Nath since using a piston in conjunction with a wafer support allows the wafer to be moved to multiple vertical positions (Matsukawa, col. 7 lines 39-54).

10) Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nath as shown above, further in view of Doering et al (U.S. Pat 6,387,185).

Referring to claim 4, Nath discloses the apparatus shown above. However, Nath does not explicitly teach that the wafer support is an electrostatic chuck.

Doering teaches a deposition apparatus whereby a wafer in a processing chamber may be secured via an electrostatic chuck (col. 9 lines 48-51).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize an electrostatic chuck in the apparatus taught by Nath since clamping a substrate to an electrostatic chuck prevents backside deposition of the substrate (Doering, col. 7 lines 21-24).

11) Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nath as shown above, further in view of Ovshinsky (U.S. Pat 4,664,939).

Art Unit: 2125

Referring to claims 7-9, Nath discloses the apparatus shown above. However, Nath does not explicitly teach a gas supply panel coupled to the deposition chamber, nor gas lines which couple the gas supply panel to the deposition chamber, nor a gas exhaust pump coupled to the deposition chamber.

Ovshinsky teaches an apparatus comprising multiple deposition chambers whereby gas supply lines exist for introducing supply gas to the deposition chambers (col. 6 lines 50-51, whereby a gas supply panel would inherently exist to control the flow of gas into the conduits) and whereby a gas exhaust line is attached to the deposition chamber (col. 13 lines 32-36, whereby the exhaust conduit would inherently use a pump to exhaust gas).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize a gas exhaust pump in the apparatus taught by Nath since an exhaust pump would allow removal of nondeposited gases of the precursor mixture (Ovshinsky, col. 6 lines 51-52) and to utilize a gas control panel and gas supply lines in the apparatus taught by Nath since each deposition chamber needs a particular mixture of gases introduced in order for deposition to take place (Ovshinsky, col. 9 lines 51-57).

12) Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nath, further in view of Sherman (U.S. Pat 5,916,365).

Referring to claim 18, Nath discloses the method above. However, Nath does not explicitly teach depositing a second monolayer on the wafer in the first deposition region.

Sherman teaches a chemical vapor deposition apparatus whereby multiple monolayers are deposited in a single deposition region (col. 5 lines 9-33).

Art Unit: 2125

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to deposit multiple monolayers in a single deposition region in the method taught by Nath since this would allow a film of a desired thickness to be grown (Sherman, col. 5 lines 20-21).

13) Claims 10, 11, 12 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sherman (U.S. Pat 5,916,365), further in view of Nath.

Referring to claim 10, Sherman discloses a method of depositing a material layer on a substrate comprising positioning a wafer on a wafer support in a deposition chamber (col. 5 lines 62-63), introducing a first deposition gas into the chamber wherein a first monolayer of the deposition gas is chemisorbed onto the surface of the substrate (col. 6 lines 27-33), then exhausting the first deposition gas and introducing a new deposition gas into the chamber whereby a first monolayer of a second deposition gas is chemisorbed on the first monolayer of the first deposition gas (col. 6 lines 33-41), and repeating these steps until a material layer having a desired thickness is achieved (col. 6 lines 42-43). However, Sherman does not explicitly teach that the deposition chamber comprises two deposition regions and that the wafer support is moveable between said regions for each deposition stage.

Nath teaches an apparatus comprising a deposition chamber, wherein the deposition chamber is divided into two or more deposition regions that are integrally connected to one another and a wafer support disposed in the deposition chamber, wherein the wafer support is moveable between the two or more interconnected deposition regions (col. 7 lines 67-68 and col. 8 lines 1-46 and Figure 4, whereby individual wafers may be moved between connected deposition chambers).



Therefore, it would have been obvious to one skilled in the art at the time the invention was made to move the wafer support shown by Sherman between interconnected deposition regions in order to accomplish multiple stages of deposition since this would allow successive layers to be deposited on a substrate (Nath, col. 3 lines 33-36) and since moving the wafer support between multiple regions would allow for quicker deposition than the process of introducing a gas, completely exhausting said gas, introducing a second gas, and repeating.

Referring to claim 11, the claim varies from claim 10 in that it claims a software routine executed on a computer storage medium rather than a method. The rejected method of claim 10 could inherently be executed via a software routine on a computer storage medium. Therefore, referring to claim 11, see rejection of claim 10 above.

Referring to claim 12, Sherman discloses the executable software routine above. However, Sherman does not explicitly teach changing the elevation of the substrate support.

Nath teaches an apparatus comprising a deposition chamber, wherein the deposition chamber is divided into two or more deposition regions that are integrally connected to one another and a wafer support disposed in the deposition chamber, wherein the wafer support is moveable between the two or more interconnected deposition regions, and the wafer support may change elevation (col. 7 lines 51-68 and col. 8 lines 1-46 and Figure 4, whereby individual wafers may be moved between connected deposition chambers, and whereby the deposition chambers may be arranged vertically with the wafer support moving between them).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to allow the substrate support to change elevation in the executable software routine taught by Sherman since moving the wafer support shown by Sherman between interconnected

Art Unit: 2125

deposition regions in order to accomplish multiple stages of deposition would allow successive layers to be deposited on a substrate (Nath, col. 3 lines 33-36) and since vertically stacking the deposition chambers would take up less floor space, allowing more room for other semiconductor fabrication devices.

Referring to claim 16, see rejection of claim 12 above.

***Response to Arguments***

14) Referring to Applicant's arguments regarding independent claim 1, Applicant argues that Nath does not teach a deposition chamber divided into two or more integrally connected deposition regions with a wafer support that is moveable between the two or more interconnected deposition regions. The examiner respectfully disagrees with Applicant's argument and stands behind the original rejection.

The recited columns, lines, and figures of Nath in regard to claim 1 in the rejection maintained above clearly show all the features of claim 1. It is noted that Applicant has argued a first embodiment of the Nath reference, while the examiner has relied upon a second preferred embodiment of the Nath reference to reject the claim. Column 7 line 51 through column 8 line 46 and Figure 4 of the Nath reference clearly read upon independent claim 1 as currently recited.

Referring to Applicant's arguments in regard to claims 2, 4, 7-9 and 10-11, Applicant once again relies upon an incorrect embodiment of the Nath reference, and the examiner stands behind the original rejection.

***Conclusion***

15) **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

Art Unit: 2125

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

16) Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander J Kosowski whose telephone number is 703-305-3958. The examiner can normally be reached on Monday through Friday, alternating Fridays, 8:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Picard can be reached on 703-308-0538. The fax phone numbers for the organization where this application or proceeding is assigned are 703-746-7239 for regular communications and 703-746-7239 for After Final communications. In addition, the examiner's RightFAX number is 703-746-8370.

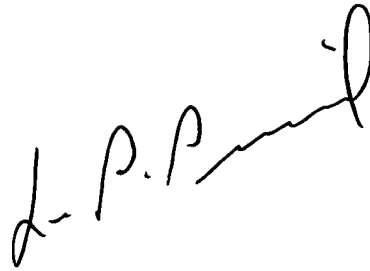
Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Alexander J. Kosowski  
Patent Examiner  
Art Unit 2125

Application/Control Number: 09/917,842

Page 11

Art Unit: 2125

A handwritten signature in black ink, appearing to read 'L. P. Picard', written diagonally across the page.

**LEO PICARD**  
**SUPERVISORY PATENT EXAMINER**  
**TECHNOLOGY CENTER 2100**